SEISMIC HAZARD ASSESSMENT

HAZARD: any physical phenomenon associated with an earthquake (ground shaking; fault movement; landslides; tsunamis; liquefaction etc.)

RISK: the probability of human casualties or injuries, and dollar damage or loss to property, buildings, roads, and other infrastructure.

So seismic risk is a probabilistic expression of the product of seismic hazard and its consequences.

e.g. the output of a seismic risk analysis may show the probability in dollars from a nearby M8 EQ….or the probability of fatalities due to an EQ-induced nuclear power plant accident.

Questions to ask to reduce seismic risk of a new structure:

- What kind of structure is being built?
- What are the parameters of interest? (e.g. ground motions)
- What is the intended lifespan of the structure?
- How serious would the consequences be if the structure could not withstand an EQ?
- What needs to be known about the geology or seismology to answer these questions?
PROBABILISTIC VERSUS DETERMINISTIC ASSESSMENTS

Examples:

DETERMINISTIC

Worst-case scenario is a M7.4 EQ occurring along a north-trending, vertical strike-slip fault with a closest approach to a site of interest of 15 km which, in turn, will give rise to a peak acceleration at this site of 0.4g.

PROBABILISTIC

Two possibilities at a certain location are:

(1) a 50% probability of exceeding 0.3g during the 30-year projected lifespan of a structure under consideration.

(2) A 5% probability of exceeding 0.6g during this time.

What is an acceptable risk?